REMARKS

In the September 23, 2004 Office Action, the Examiner noted that claims 1-12 were pending in the application; allowed claims 5-10 and 12; objected to Figs. 1 and 2; and rejected claims 1-4 and 11 under 35 U.S.C. § 102. In rejecting the claims, U.S. Patents 5,731,781 to Reed (Reference A) and 6, 426,716 to McEwan (Reference C) were cited. Claims 1-12 remain in the case. The Examiner's rejections are traversed below.

The Application

The application is directed to a system that transmits a pulse signal and receives a reflection of the pulse signal. The received signal passes through envelope detector 19 (Fig. 4) and amplifier 20 prior to undergoing a gate operation in gate circuit 21. The gate circuit is controlled by a pulse signal from pulse generation circuit 14 which is in turn driven by the delayed output of rectangular wave generator 11. Rectangular wave generator 11 is also used to drive pulse generation circuit and band limiter 12 to produce the pulse signal that is transmitted by the system, and subsequently by I-Q detector 23 after filtering by low-pass filter 24.

The Prior Art

U.S. Patent 5,731,781 to Reed

The Reed patent is directed to a continuous wave wideband precision ranging radar. As illustrated in Fig. 1, the output of data source 12 (Fig. 1) and noise code generator 11 is mixed by mixer 12a to produce an output that is used to control phase modulator 13a which modulates the carrier signal generated by local oscillator source 15 prior to transmission. The output of noise code generator 11 also passes through delay unit 14 to control phase modulator 13b which modulates the carrier signal from local oscillator 15 to generate a "delayed noise and carrier signal" that is supplied to downconverter mixer 17 for mixing with the received delay noise/data/ carrier signal prior to further processing.

U.S. Patent 6,426,716 to McEwan

The McEwan patent is directed to a modulated pulse Doppler sensor. As illustrated in Fig. 1, pulse repetition frequency (PRF) generator 14 generates pulses that are delayed by delay modulator 16 under control of the output from range oscillator 22 which is phase locked to PRF generator 14, or has a clock input connected to the PRF generator. The delay modulated pulses are supplied to transmit pulse generator 18 which produces an output that is added by summation element 26 to the output from mixer pulse generator 29 which receives a signal generated by PRF generator 14 after being delayed in adjustable delay element 24. As indicated in Fig. 1, transmit pulse generator 18 and mixer pulse generator 29 have different pulse widths (1 and 2, respectively) and adjustable delay element 24 is controlled to determine the minimum range. In an alternate embodiment, range oscillator 22 modulates the delay of adjustable delay element 24 (optionally) instead of controlling delay modulator 16, but in both cases the output of PRF generator 14 is delayed under the control of the output from range oscillator 22. The output of summation element 26 drives RF oscillator 12 which outputs transmit pulses T from transmit pulse generator 18 and mixer pulse signals M from mixer pulse generator 29. The output of RF oscillator 12 is transmitted via antenna 20 to a target and echo pulses E are received by antenna 20 and supplied on line 28 along with the transmit pulses T and mixer pulses M to mixer 30. Since "the echo pulses E alone are too weak to activate the mixer—only echo pulses that arrive during a T or M pulse get mixed" (column 5, lines 26-28). The output of mixer 30 passes through RF filter 32 and RF amplifier 34 prior to being supplied to envelope detector 36, controlled by the direct output of range oscillator 22. Envelope detector 36 "recovers Doppler information carried on echo pulse E from moving objects within the desired sensing region" (column 6, lines 2-4).

Rejections under 35 U.S.C. § 102

In item 5 on page 3 of the Office Action, claims 1, 3, 4 and 11 were rejected under 35 U.S.C. §102(b) as anticipated by Reed. However, it is not entirely clear what components in Reed are believed to correspond to the elements recited in the claims. It will be assumed that noise code generator 11 in Reed is believed to correspond to the control pulse generation unit recited in claim 1 and the control pulse generation means recited in claim 11, while mixer 17 is believed to correspond to the gate unit recited in claim1 and gate means recited in claim 11. If this correspondence is incorrect, the next Office Action should not be made final, since the September 23, 2004 Office Action was insufficiently clear to enable the Applicants to provide a complete response.

First, it is submitted that the mixer 17 disclosed by Reed is not equivalent to "a gate unit performing a gate operation on a received signal using the control pulse signal" (claim1, last 2 lines). Mixer 17 combines the received signal with a signal that is the combination of "DELAYED NOISE" and "CARRIER" signals which do not produce a control pulse signal, but rather an oscillating signal that has been phase modulated by a delayed noise signal. Furthermore, there is no "gate operation" (e.g., claim 11, line 6) performed by mixer 17. The gate operation of the gate unit in claim 1 and gate means in claim 11 passes a signal only when the controlling signal is ON, while mixer 17 in Reed is described as a "downconverter" which performs an inversion-modulation with respect to phase, not a gate operation. This enables the present invention to provide the benefit of distinguishing echoes arriving from various objects more easily and results in erroneous detection of echoes being less likely, because the ON/OFF ratio is higher than the rejection ration associated with the phase inversion modulation method disclosed by Reed. For the above reasons, it is submitted that claims 1 and 11, and claims 3 and 4 which depend from claim 1 patentably distinguish over Reed.

In item 6 on pages 3-4 of the Office Action, claims 1, 2, 4 and 11 were rejected under 35 U.S.C. § 102 (a) or 102(e) as anticipated by McEwan. As in the case of the rejection relying upon Reed, it is unclear what components taught by McEwan are believed to correspond to the elements recited in the claims and therefore, the next Office Action should not be made final if the assumptions below are incorrect. In the Office Action, it was asserted that McEwan discloses "a range-gated pulse Doppler system with a signal delay control means" (page 4, lines2-3). While the output of receiver 35 in Fig. 1 is labeled "range gated Doppler", the inputs to receiver 35 are the undelayed output of range oscillator 22 and the transmission, mixer and echo signals on line 28. The only control signal is the undelayed output of range oscillator 22. Therefore, describing the circuit illustrated in Fig. 1 of McEwan as having "a signal delay control means" is inaccurate. The signal that is delayed is the output of PRF generator 14 prior to transmission, not a signal used to control receiver 35.

Furthermore, it is submitted that the only component of receiver 35 that could correspond to the gate unit or gate means recited in claims 1 and 11 is envelope detector 36. Clearly the filters 32, 38 and amplifiers 34, 40 do not correspond to a gate unit. Mixer 30 has only a single input containing multiple signals that are passed through only if transmit pulses T or mixer pulses M are present, because the energy required to perform a mixing operation is not available if only an E signal is present. Therefore, it is submitted that the mixer 30 of McEwan does not perform "a gate operation" or use a "control pulse signal" as recited in claims 1 and 11.

Unlike mixer 30, envelope detector 36 in McEwan does receive a control signal. However, as noted above, the signal controlling envelope detector 36 is received from range oscillator 22 without any delay. There is no attempt in McEwan to control the operation of the envelope detector 36 with respect to timing of the echo signal. In other words, there is no "control pulse generation unit generating a control pulse signal by **delaying** a basic signal" (claim 1, lines 3-4). For the reasons set forth above, it is submitted that claims1 and 11, and claims 2 and 4 which depend from claim 1 patentably distinguish over McEwan.

Summary

It is submitted that the references cited by the Examiner do not teach or suggest the features of the present claimed invention. Thus, it is submitted that claims 1-4 and 11, in addition to claims 5-10 and 12, are in a condition suitable for allowance. Reconsideration of the claims and an early Notice of Allowance are earnestly solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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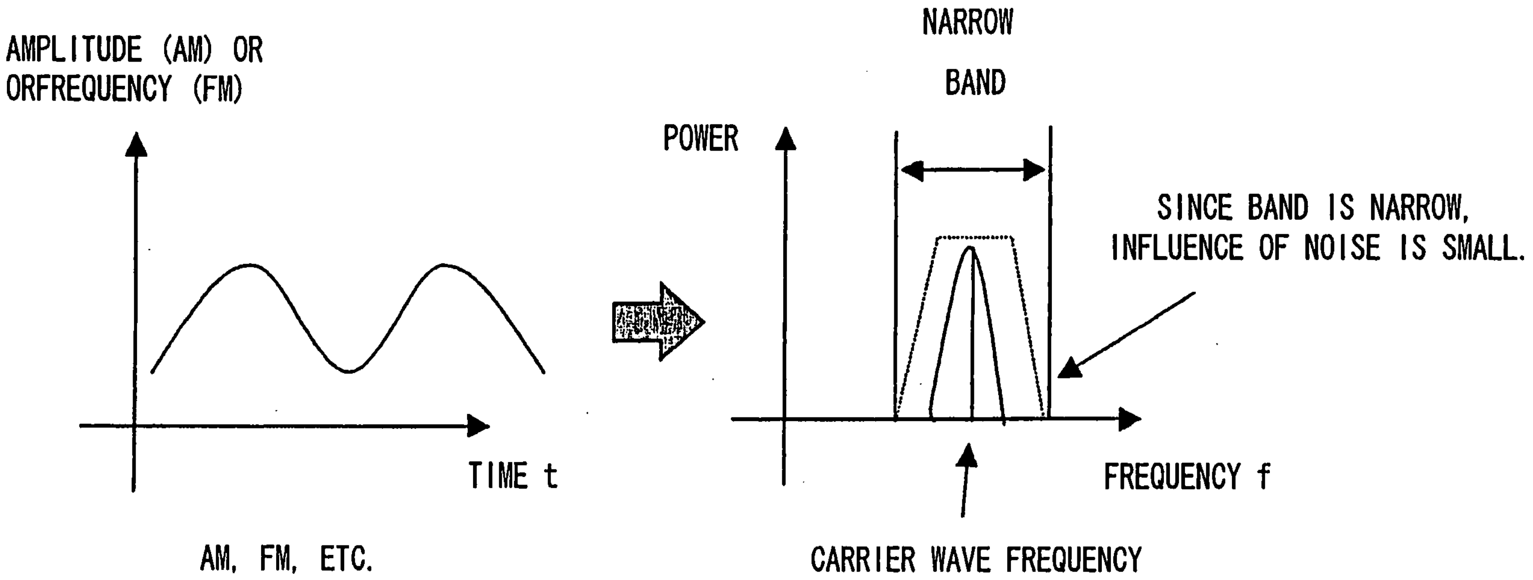
AMENDMENTS TO THE DRAWINGS:

The attached drawing(s) include changes to FIGS. 1, 2, 4 and 17.

In the Office Action at item 2, the Examiner objected to the drawings. To overcome these objections, replacement sheets for FIGS. 1 and 2 are submitted herewith, including the legend "PRIOR ART", as required.

The sheets containing FIGS. 4 and 17 replace the original sheets including FIGS. 4 and 17 to correct the spelling of "GENERATION" in block 14.

For the convenience of the Examiner, annotated sheets showing the changes made are attached. Approval of these changes to the Drawings is respectfully requested.



F I G. 1

PRIOR ART

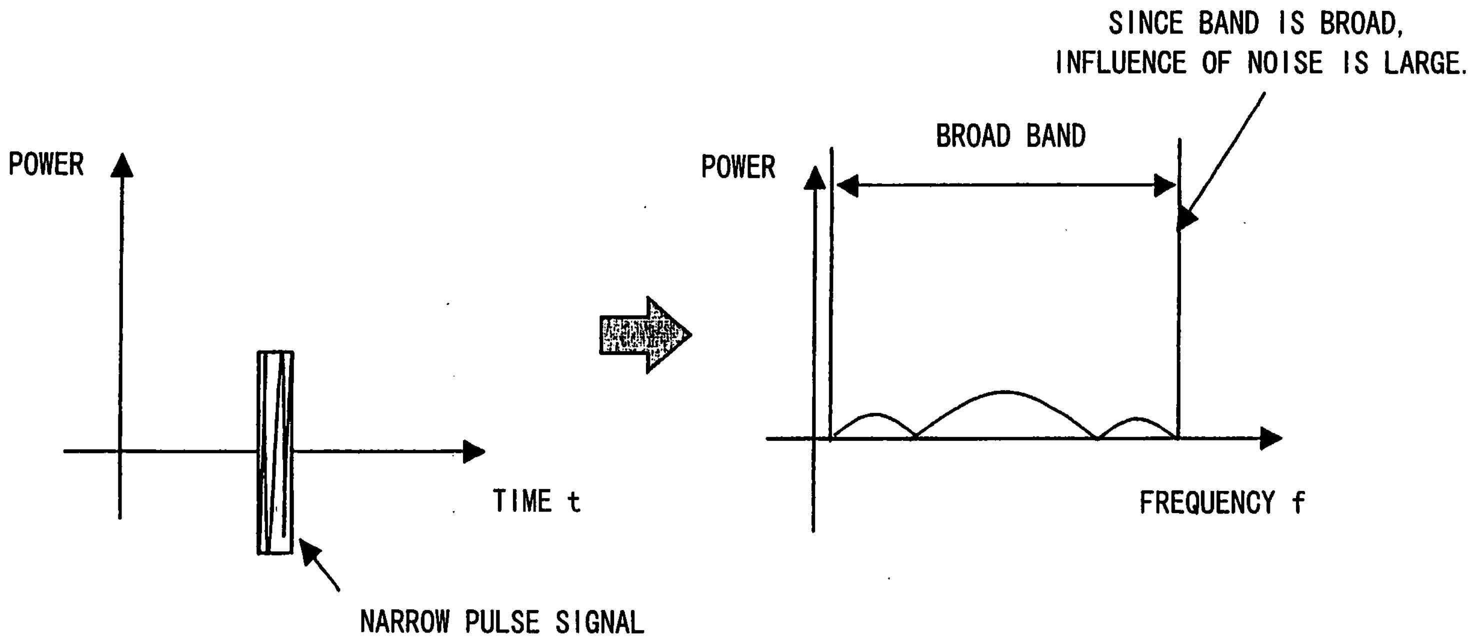


FIG. 2

PRIOR ART

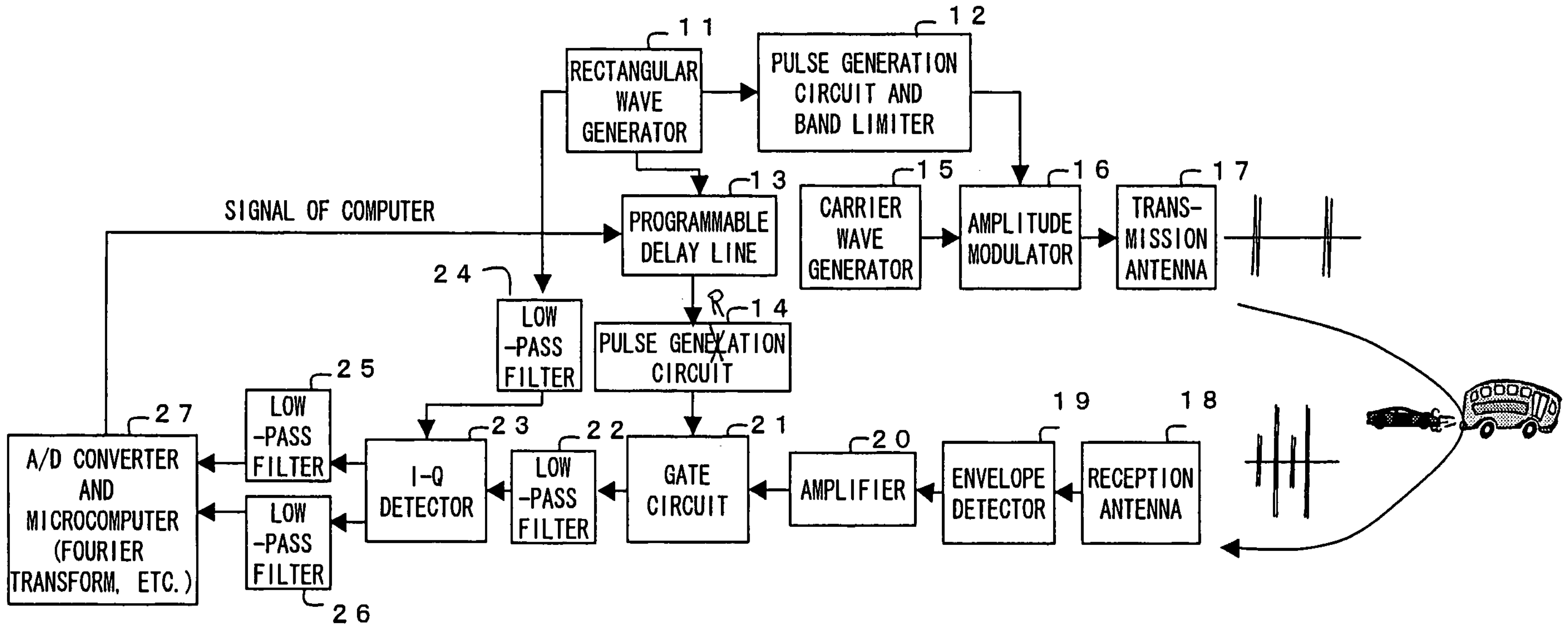
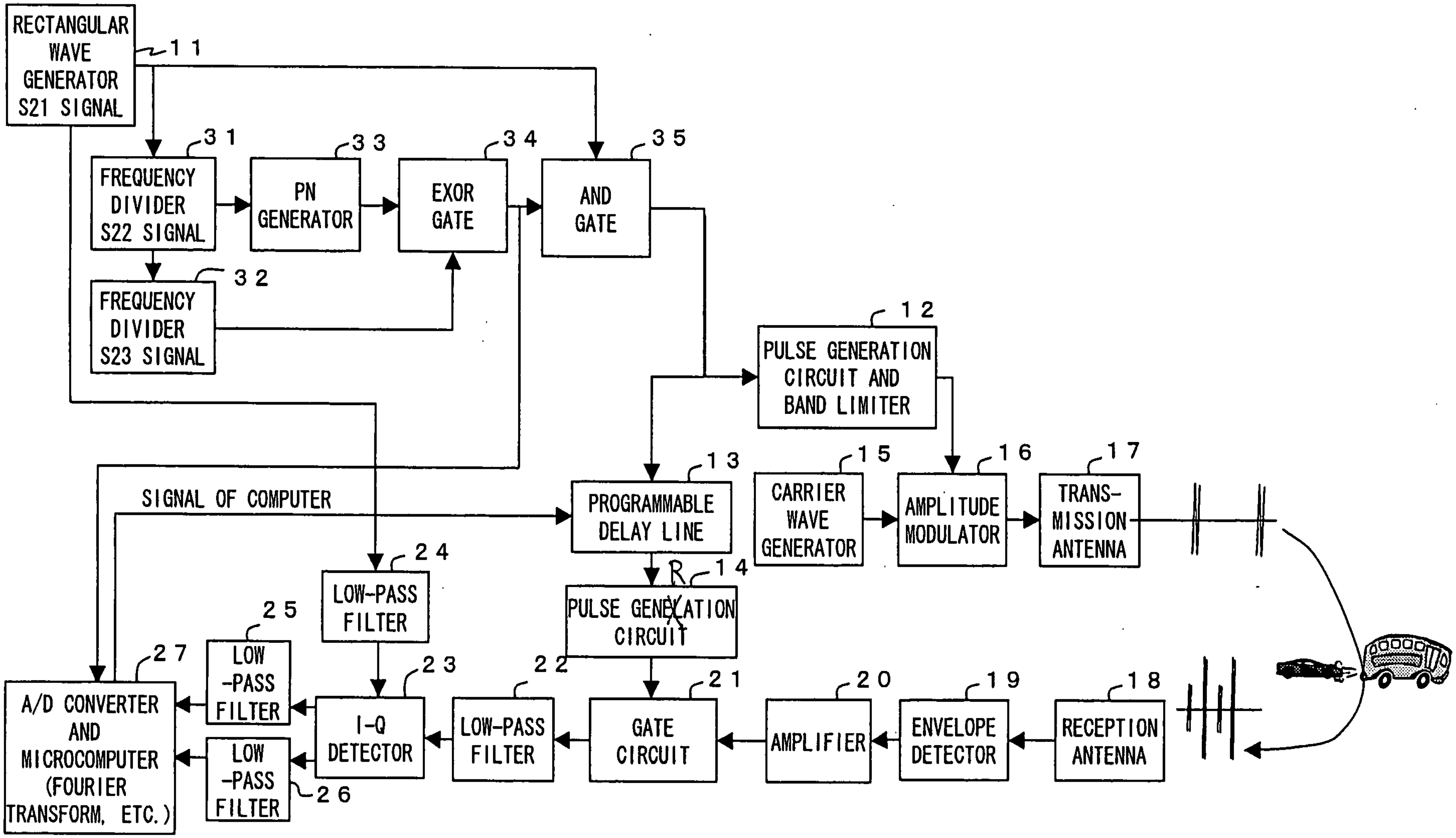

11
RECTANGULAR WAVE GENERATOR
12
PULSE GENERATION CIRCUIT AND BAND LIMITER
13
PROGRAMMABLE DELAY LINE
SIGNAL OF COMPUTER
14
R
PULSE GENE~~X~~ATION CIRCUIT
15
CARRIER WAVE GENERATOR
16
AMPLITUDE MODULATOR
17
TRANS-MISSION ANTENNA
18
RECEPTION ANTENNA
19
ENVELOPE DETECTOR
20
AMPLIFIER
21
GATE CIRCUIT
22
LOW -PASS FILTER
23
I-Q DETECTOR
24
LOW -PASS FILTER
25
LOW -PASS FILTER
26
LOW -PASS FILTER
27
A/D CONVERTER AND MICROCOMPUTER (FOURIER TRANSFORM, ETC.)

FIG. 4


RECTANGULAR WAVE GENERATOR S21 SIGNAL
11
FREQUENCY DIVIDER S22 SIGNAL
31
PN GENERATOR
33
EXOR GATE
34
AND GATE
35
FREQUENCY DIVIDER S23 SIGNAL
32
PULSE GENERATION CIRCUIT AND BAND LIMITER
12
PROGRAMMABLE DELAY LINE
13
CARRIER WAVE GENERATOR
15
AMPLITUDE MODULATOR
16
TRANS-MISSION ANTENNA
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SIGNAL OF COMPUTER
LOW-PASS FILTER
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A/D CONVERTER AND MICROCOMPUTER (FOURIER TRANSFORM, ETC.)
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21
AMPLIFIER
20
ENVELOPE DETECTOR
19
RECEPTION ANTENNA
18
LOW -PASS FILTER
26

FIG. 17